SCIENCE.—SUPPLEMENT.

FRIDAY, JUNE 18, 1886.

HOW TO TEACH GEOGRAPHY.

If American teachers of geography and history could know and appreciate how those subjects are taught in the best schools, and in fact generally throughout Germany, Austria, and France, they would hardly be able to recognize the fact that large and interested classes were in those countries deriving keen intellectual enjoyment, and also acquiring sound and lasting knowledge from and of two subjects which in our primary and intermediate schools are, as a rule, matters of weary memorizing and mechanical drudgery. To teach is something that most of our teachers sadly need to be taught; and of geography this is perhaps unusually true. The usual method in this country is to compel a child of from seven to twelve years to first learn an abstract definition of geography; then follow some erudite sections as to the distribution of land and water on the globe, races of men, climate, and so forth, all stated in technical language that might well appal some older persons, to say nothing of child-minds, to whom the subject is new and utterly strange. After several pages of this material have been carefully stored away in the wholly unappreciative memory, a map is introduced, and the study of geography proceeds with the learning of the names of countries, rivers, mountain-chains, towns, and other unmanageable details, all of which are treated as if they had no connection whatever with one another. In a year or two geography is 'finished,' and the process of forgetting much of it begins. This barbarous, useless, and unscientific method of teaching (it may be so called by courtesy) geography is not confined to this country: it is the method usually followed in England also: and a paper on the subject, read by R. Elliot Steel, F.R.G.S., before the College of preceptors in London, and reported at some length in the *Educational times* for May, is quite as deserving of attention here as in England. Mr. Steel summarizes the abuses and deficiencies of the present system of teaching geography under the following heads: 1°. In maps, ignorance of scale, and failure in remembering the general outlines of a country and its principal physical features, in consequence of the use of maps crammed with details, and unsuitable for teaching-purposes; 2°. More than any thing, ignorance of physical geography, including the simplest laws of the inorganic world; 3°. Total neglect of history; 4°. Ignorance of the commercial aspects of a country.

The fundamental cause of all these shortcomings is the fact that geography is not taught as a unity in any of the universities, and therefore the vast majority of the text-books are written by book-makers, and not by ardent students and teachers of the subject. Thus, the school-atlas is a clumsy, ill-constructed affair, generally designed to help adults find some obscure place or river, rather than to teach geography. The matter of scale is wholly overlooked; and the child sees no incongruity in asserting Spain to be as large as the United States, or Europe to equal Asia in size, for do not both occupy a full page of the book? This matter of scale is of primary importance, and cannot be taught abstractly. It is well to have the schoolroom supplied with a series of maps, all drawn to the same scale, say, 1: 10,000,000. But it is far better to teach the child experimentally. Let him measure the schoolroom in units (feet and inches) perfectly definite and well understood. Then let him draw a plan of the schoolroom on the blackboard, reduced to a scale, and then compare objects with this picture. Gradually the object delineated can be changed from the schoolhouse to the block, from the block to the village or city, from the city to the state; and so on. This will fairly fix in the beginner's mind the principles of map-drawing, and after that a map will cease to represent to him merely a page of the text-book.

At present we teach words and phrases, abstractions, instead of circumstances, natural laws, and material things. For example: what possible good can be derived from making a child learn from a book that a glacier is a river of ice, which descends the slopes of high mountains, till it finally melts in warmer regions or reaches the sea? Such knowledge as this would not even fit the pupil to read profitably so popular and untechnical a book as Tyndall's 'Hours of exercise in the Alps.' Should not instruction concerning glaciers rather be given somewhat as follows? to take some snow or pounded ice, to compress it into a hard, ice-like mass, to point out how, in a similar way, after a fall of snow, the upper layers compress by their weight the lower, and how ice thus becomes formed in the cavities and gulleys

of mountains above the snow-line; then to take a piece of ice, and, by means of a wire with weights attached, to show how the ice may be slowly cut, and how it will refreeze, and thus to illustrate the passage of the glacier along its bed; to show by illustrations, preferably photographs, the nature of the moraines, the final melting of the glacier, and the formation of the resulting river. In this way the pupil's knowledge of glaciers is real and permanent, and he is prepared to read of them, and of theories about them, with appreciative interest. And in the process some elementary facts of physics and mechanics, and the simpler laws of heat, have been learned.

Again: if a child draws a map himself, and locates, say, a hundred places on it, he will probably remember them all; while not ten per cent of them, if learned from an outline-map, would be retained. The influence of geography upon history is one of the most potent of facts to the trained scholar, and, although it admits of very elementary demonstration, it is almost invariably disregarded in teaching geography. Surely it could easily be taught that there is a connection between tropical climate and despotism, between temperate climate and freedom; that vast pastures have implied a feudal society of chiefs and dependents; that aristocracy is the natural constitution of a pastoral state; that the sea and the mountains have in many instances directed the current of civilization and of political development. Books like Huxley's 'Physiography,' Geikie's 'Elementary lessons in physical geography,' and Grove's 'Class-book of school geography,' should form part of the instruction of every pupil.

Finally, the connection between geography and various phases of political and commercial life should be pointed out. It should be shown why it is that various portions of a country have various pursuits, why manufacturing, mining, agriculture, the carrying trade, respectively, are carried on in certain sections and from certain centres. From this the transition is simple and evident to the lines of trade and commerce, — whence we receive our various imported goods and why, and what we export in exchange. Then, as a means of teaching concerning peoples and products, every school should contain a museum, that the pupils might see and handle the objects of which they have read and studied. In this way, and only in this way, can the study of geography be placed upon a scientific basis, and made the vehicle of practical knowledge instead of a task in committing dry details to memory. If our teachers are to do their part in this work, they must be shown how to do it, and trained to do it. For this we must look, we hope not in vain, to our normal schools, training-classes, colleges, and universities.

THE OCCUPATIONS OF THE BRITISH PEOPLE.

The London *Times* of May 21 has an interesting report of a paper read by Mr. Charles Booth before the Statistical society, on the occupations of the people of the United Kingdom, and on the changes that have occurred in the distribution of labor during the present century.

The *Times* says, "The inquiry is a difficult one, owing to the imperfections of the earlier returns, and the changes which have taken place in the mode of recording social phenomena. It was not until 1831 that any attempt at detailed classification of occupations was made, and even then it was of a limited and unsatisfactory kind. The next census showed some improvement; and at length, in 1851, the system was originated which still prevails, and under which the entire population is brought under enumeration and grouped into seventeen classes, with numerous sub-classes. But the system has suffered considerable modification from decade to decade since that date, and, in particular, large numbers have been transferred from one class to another; so that any thing like a trustworthy comparison of the details of successive decades becomes a matter of very great labor and difficulty. Mr. Booth has constructed tables in which these defects in the records are, as far as possible, remedied, and the figures for different periods reduced to common denominators. Some of the results will probably be found surprising by those who have not entered upon careful examination of their natural impressions."

Mr. Booth stated, that, as regarded England and Wales, between 1851 and 1881 the proportion of industrially employed women over fifteen, compared to the rest of the female population, had decreased continuously, but that the proportion of those otherwise employed — in domestic service, teaching, etc. — had increased in an equal degree year by year; so that the total employed one way or another remained practically constant. Having in a tabular form divided the whole population, taking the occupied and unoccupied together, he stated that all males over twenty were counted, for this purpose, with the occupied or self-supporting class, and the whole employed class might be divided as follows in the periods 1851, 1861, 1871, and 1881 respectively: all forms of industry (productive or distributive), 78.4, 77.2, 75.5, 74.2 per cent; public and professional service, 4.6, 5.3, 5.5, 5.6 per cent; domestic service, 13.3, 14.6, 15.8,

15.7 per cent; property-owning (so returned), 2.5, 2, 2, 2.2 per cent; and indefinite, 1.2, 0.9, 1.2, 2.3 per cent. The increase of 1 per cent in the indefinite class for 1881 was due to the transfer to this class of retired persons, who, in previous censuses, were returned under their former occupations; but, at best, those tabulated under this head were a meaningless remainder, the result of accident or defects of enumeration. Similarly the class called property-owning was entirely delusive. It contained a few land-owners, house-owners, and others who might as reasonably be included with other employers of labor in the sections of industry, and it also included a good many independent women.

It is certain that during the thirty years in question the classes whose maintenance depended on the mere possession of property must have been largely augmented. It would further be seen that public and professional service, with domestic service, had gained what productive and distributive industry had lost, and that this movement had been progressive. With regard to domestic service, it was noteworthy that the increase was mainly in the women and girls, the indoor men-servants having decreased from 74,000 in 1851, to 56,000 in 1881, while the population had risen from 18,000,000 to 26,000,000, — a fact which would seem to indicate a greater diffusion of wealth, and also, perhaps, less ostentation of expenditure among the very rich.

In public service and the professions the percentage of persons occupied in administration, law, and medicine, had slightly decreased; while police, amusement, and education had increased, education especially showing, as might be expected, a large addition in the last decade.

Coming to a detailed review of the industrial classes, he stated that the production of raw material employed a decreasing percentage. The English depend more on what they import, and less on what they find at home. The reduction, however, fell entirely on agriculture, as the percentage employed in fishing and mining had increased. For the three decades since 1851, those employed on the land had decreased at the rate of 3½, 11½, and 11 per cent respectively; being 26 per cent for the thirty years, or, stated in numbers, 60,000, 196,000, and 163,000, which added up to 419,000, an enormous total. Against these losses, which were mostly in ordinary agricultural labor, must be set the equivalent of the increased use of machinery, before we could say that less energy was devoted to the cultivation of the soil now than thirty years ago. A new class connected with the application of science to agriculture had sprung into being, and its increasing numbers pointed to a change of system, involving improvements, rather than neglect of any kind, as a cause of the decrease in the agricultural population. It seemed to be assumed by many that the reduction in the proportion of those who lived by agriculture, as compared to those who lived by other means, was not only an absolute evil, but necessarily the result of economic error of some kind, and England's land system was responsible. Such views he regarded as mistaken and misleading. His business, however, was to state the facts as given in the census returns; and these showed us, that, in the last thirty years, England had changed from a population about half agricultural and half manufacturing, to one in which manufacture was double of agriculture, and we had no reason to suppose that the process of change in this direction was yet ended. This change had been accompanied by an enormous increase in the total population, so that altogether support had been found during this period in other ways than the tilling of the soil for a new population of 8,500,000 souls. Since the beginning of the present century we had had to find new means of support for no fewer than 17,000,000 people. In calling attention to and correcting certain statements, which had been made with regard to what was called the 'depopulation' of our rural districts, — statements made, he said, to support propositions of violent social change, — Mr. Booth stated that the exodus from rural or non-urban districts amounted to 605,000 instead of 2,000,000 (mentioned by Mr. Wallace in 'Bad times' as the decrease between 1871 and 1881 in the rural population), and that the influx into the towns was less, again, than the total exodus from the rural districts by reason of the loss by emigration, finally reducing Mr. Wallace's 2,000,000 to 441,000. The greatest influx into urban areas was into comparatively new places, while the next greatest movement was that into the country districts surrounding the present centres of population, and especially adjacent to the new urban districts.

Purely agricultural districts had lost population largely, but otherwise there had been all over the country a fair distribution of the increasing millions, and everywhere new occupations had been found. It was unfortunately impossible to trace the occupations, other than agriculture, of the non-urban population. The backbone of the industrial organism they were studying was building and manufacture, which he ventured to bracket as being alike the turning of raw materials into things serviceable; and they found that this remained nearly constant, at 38 per cent of the employed population.

The industrial development of England since 1851, and her apparent position in 1881, might, on the whole, be regarded with satisfaction; nor could any changes since 1881 have seriously affected the result. The growth of the population of Scotland (6¼, 9¼, and 11½ per cent for the three decades) had been slower than that of England, and the proportions engaged in each main division of industry were somewhat different; but the points of similarity were much more noticeable than the points of difference.

If the picture given of the condition of agriculture in England and Scotland was gloomy, that of the whole condition of Ireland was much more so. The numbers employed in agriculture had decreased since 1841 by 858,000, out of a total of 1,844,000; and those who might, perhaps, be counted as supported by agriculture, by 2,500,000 out of 5,000,000. Nor was that all; for, these reductions being proportionately greater than those of the whole population, the percentage employed in or supported by agriculture had decreased, as well as the total numbers. The land in England and Scotland employed as many, and probably supported nearly as many, as it did in 1841; and meanwhile other productive industries supported the bulk of our great increase of population. In Ireland, on the other hand, not only did the land fail to support half of those it once in some fashion maintained, but other productive industries (e.g., building and manufacture) were even worse off, and, like agriculture, showed it both in numbers and percentage, those engaged in building and manufacture (taken together) being 10.9 less in percentage, as well as 626,000 fewer in number, than in 1841. It was when taken together that these facts appeared so serious as evidence of decadence. Nevertheless, the view was commonly held, that, in general well-being, Ireland had enormously improved since the famine. No evidence of this improvement was to be found in the occupation returns, which, on the contrary, pointed to a demoralization of industry likely to be the cause, as well as consequence, of poverty and waning trade, and certain to be the source of political discontent. He knew that figures might be, and were, drawn from bank deposits and other returns which seemed to tell a different story. He would not attempt to reconcile this conflict of evidence, as to do so would be beyond the scope of his paper.

The *Times*, continuing its comments, says, "Before drawing conclusions as to the amount of labor applied to the soil, we have to remember that much of the apparent loss is simply due to the substitution of machinery for human activity, and also that numbers of men now included in the manufacturing class are, in fact, employed, though indirectly, in extracting food from the soil. A reaping-machine supersedes a great deal of rural labor, but its construction involves the labor of a great many miners and artisans. It is perfectly proper to include these in the manufacturing classes for statistical purposes; but it would be a wanton misuse of statistics to ignore the fact, when the supply of food is in question, that it is the growth of food which provides them with employment. Mr. Ruskin asserts for himself the right to rail at all substitution of machinery for human handicraft; but practical men who accept labor-saving machines in cotton-mills cannot consistently object to their introduction into corn and beef factories, however much they may lament the tendency of 'progress' to transfer men from the open air to confined workshops. It curiously illustrates the continual failure of statistics to overtake the changes occurring in the social organism, that the distinction, apparently so sound and simple, between agricultural and manufacturing industry, utterly breaks down upon examination. There may be an actual decrease in the amount of energy applied to the production of food; but statistics do not tell us what it is, because they fail to discriminate between real withdrawal of energy from agriculture and mere change in the methods of applying it."

MRS. SIDGWICK AND THE MEDIUMS.

The May meeting of the London society for psychical research was the occasion of the presentation of a paper by Mrs. Henry Sidgwick, which has been looked forward to with interest. The title of the paper was "Results of a personal investigation into the physical phenomena of spiritualism, with some critical remarks on the evidence for the genuineness of such phenomena." By physical phenomena of spiritualism, Mrs. Sidgwick means those which, if correctly described, and not due to conscious or unconscious trickery, nor to hallucination on the part of the observers, exhibit the action of a force in the physical world which has been previously unknown. Such physical phenomena would include raps, movement of tables without contact, materializations, psychography, and so forth. The writer stated that her experience in spiritualism extended over a period of twelve years, and had been entirely inconclusive except in cases where the phenomena were proved to be due to the action of the medium. She had had *séances* with all the leading English mediums (including Dr. Slade), and in every case there was evidence pointing more or less directly to deception and conjuring. The first part

of the paper was concluded with a description of the kinds and methods of deception practised by a medium named Haxby.

Mrs. Sidgwick then went on to discuss the various causes of error. She did not believe that hallucination, i.e., perception without objective counterpart, which Von Hartmann suggests as the explanation of what is seen at *séances* of this kind, had occurred in her own experience; but illusion, meaning the misinterpretation of what is really perceived or the confusing of inference with observation, was very common. It was believed that this was often the case when friends and relations are recognized in the 'materialized' forms.

Moreover, in estimating evidence concerning *séances*, a wide margin must be left for conjuring of a more special kind, and also for mal-observation arising from other causes, such as the ignorance of the observer as to the precise phenomena and conditions to be expected. Mrs. Sidgwick said that two arguments against the reality of the physical phenomena of spiritualism gained in force every year: 1°, the absence of phenomena about which there could be no question as to conjuring raised; and, 2°, the fact that almost every medium who had been prominently before the public had been detected in fraud. Nevertheless, the writer felt that there was some evidence not to be neglected, and which made it a duty to seek for more; but she considered it a waste of time to seek it with professional mediums under the conditions imposed at present. It is probable that many of the conditions supposed to be necessary, and which complicate the investigations and increase their difficulty, are invented merely to facilitate trickery.

Mrs. Sidgwick's paper was candid and able, and dealt with evidence, not theories. It is one more example of the good work being done by the Society for psychical research in determining just what basis there is for the multitude of current beliefs concerning certain classes of psychical and semi-psychical phenomena. In this case the conclusions are negative — or, as was remarked in the discussion of the paper, positive — as to imposture.

THE EVOLUTION OF LANGUAGE.

THE present advanced condition of our knowledge of language reflects, as well perhaps as any other study, the advantages of the modern method of research. One marked feature of that method is the taking of a broad general point of view, from which almost any pertinent fact bears an interest and a meaning: it does not narrowly and pedantically say such and such is my domain; what is outside does not concern me. The condition of logic about one hundred years ago shows what happens when the latter position is taken. A second feature of modern methods of study is the importance assigned to the evolution of things: we want to know not only how things are, but quite as well how they came to be so; only then do we say we understand them.

Both these methods have been applied to language. Language is considered from a broad biological point of view as the means of communication between the same or different animal species. Human speech is but the highest stage of a special development of one form of such a means of communication. We shall see below how it is related to more lowly forms of making one's self understood. Not only its evolution, but its devolution, its loss and impairment in disease, have been wrought out. This has led to the formulation of an important law, which tells us that the latest acquired and best organized is the first to drop out. Moreover, it has sifted out the separate moments in the acquisition of speech, by a comparison of cases in which one special function is lost, while all others remain intact. Its anatomical seat in the brain is localized with as much exactness as that of other less complex faculties. The purely philological study of language is certainly flourishing, and is making its way back into the remotest antiquity, when it seems almost to touch hands with the prehistoric man of the anthropologists.

A recent writer in *Kosmos* (Dr. Carl Francke) has presented a very readable account of the relation of human speech to that of other animals. Any thing is regarded as a language which serves as a means of communication: the system of signals (probably by use of the antennae) by which ants tell each other of a precious find is perhaps the most rudimentary type of language. When we ascend to mammals and birds, which have lungs and use them as men do, we find that the sounds thus uttered are variously affected by emotional states, and soon serve to express the presence of such emotions. The dog barks with joy, howls with pain, and pleads by whining. In this tendency of psychic states to express themselves by vocal utterances, we have the origin of speech; for they become real speech-sounds as soon as other animals appreciate their meaning. The next great step is taken when an animal utters a cry for the purpose of calling its mate, not as a half-reflex expression of its own condition. Young birds probably have not reached this stage, but dogs certainly have. A dog will bark before a closed door till some one opens it. Some animals post sentinels, which give a definite cry of

warning in case of danger. The further argument for the possession of a language-sense by mammals and birds, at least, is that they readily learn to respond to a name given them. To what extent that sense can be cultivated is shown in Sir John Lubbock's dog, which brings out a card with 'o-u-t' on it when he wants to take a walk. The close sympathy between man and the higher mammals depends upon the fact that they can mutually understand one another, can distinguish the tones of pleasure and approval from those of pain and censure. How much more difficult is it to establish a similar bond between man and a reptile, for instance! for here the scope of mutual understanding is very limited. So far, what may be called an interjectional language, that is, one composed of sounds directly expressive of accompanying emotions, has alone been spoken of. The human infant, and probably primitive man, made much use of such a language. But our present language is an intellectual, a thought language, which in some way must have been developed from the former. Before touching this rather speculative question, it will be well to consider a form of language still current, but not expressed by sounds; namely, the gesture-language. This is both the simpler and the more natural. It is possible only in animals with easily movable limbs, especially in mammals, as witness the prancing of a dog, the exposing of the canines, the purring of a cat, or pawing of a horse. The ape has a special facility in this direction, and uses its facial muscles as a means of expression. We use the gesture-language in nodding, beckoning, threatening, and so on. This language, like the spoken, is acquired by the child, but much sooner than the latter: it reaches its highest development in the less cultured tribes, while the spoken language is seen in its highest phases among the most civilized; it is more general and uniform than any spoken language, and is capable of considerable development, as is shown in the training of the deaf and dumb. All these circumstances suggest that the gesture-language is a rudimentary one, which now is on the decline, but which has had a considerable development in the past. Combining this fact with the high development of this faculty in the ape (which has almost no sound-language), we seem to be tending to the conclusion that the creature from which man developed in one direction, and the apes in another, possessed both a sound and a gesture language; that in man the gesture-language was developed at first, but was then superseded by the spoken speech, beginning probably with an interjectional vocabulary, while in the apes the gesture-language alone was developed.

A still higher stage in the evolution of human language was made when the interjectional and the gesture languages fused, and formed a sound-gesture-language. One reason for this change was that the gestures appealed to the eye, whose limit of distinct vision is very circumscribed; while speech appeals to the ear, which can hear in all directions and at great distances. This may have been prompted, too, by another reason. When desiring to communicate in the gesture-language, one would first interject a cry to call attention to that desire, and then the message would be told in pantomime. Many tribes cannot fully express their meaning without accompanying gestures, and it is told of one tribe that its members cannot communicate in the dark. But certain sounds are in direct connection with gestures. When one wants to refer to the teeth, one would point to them with the tongue; the chief function of the teeth is eating, and the interjectional cry accompanying this gesture would be modified into the word for 'eating.' Evidently, then, dentals ought to be found in the words for 'eating' in various languages. Here are a few: Gothic, *itan;* Greek, *esthiein;* Latin, *edere;* Tartar, *atarga;* Mongolian, *edeku;* Chinese, *tsiáh.* Many words for 'teeth' contain these dentals: as, *dens* ('tooth'); Persian, *dendun;* and so on. The sound *l* in connection with tongue-gestures, the sound *st* in connection with words for keeping silence (i.e., sounds with the mouth as much closed as possible), and other similar cases, could be summed up. Another class of natural words, as has long been recognized, is due to imitation. We see how strong this imitative tendency is in apes, young children, and even certain species of birds. The names of animals are given by their characteristic sounds, cuckoos, etc. The buzzing of the bees, the whizzing of the wind, the murmuring brook, are other examples.

One further step must be taken to set language on its present developmental stage: the man who pictures unseen gods in woods and streams, who sees signs of their pleasure in the flight of birds or the direction of the wind, must further extend his creative imagination to form sounds that are to be connected with new things and new deeds. Here, then, would be great range for individual differences; and the beginning of the confusion that reigned at the Tower of Babel must probably be put back to the time when the interjectional and gesture languages were still in full vigor. Once started on such a course, it is not difficult to imagine that languages would multiply and become hopelessly different and strange to one another. This is the problem of the philologists.

A critic should be lenient when considering speculations of this nature. The picture is doubt-

lessly filled in with greater detail than the facts rigidly warrant, and colors and forms are restored when age has worn off almost all traces of their original appearance. Nevertheless, the suggestiveness of the general view is valuable, and, when a better interpretation of the facts comes to hand, the old one can be modified or discarded.

JOSEPH JASTROW.

DISTRIBUTION OF COLORS IN THE ANIMAL KINGDOM.

MR. L. CAMERANO has recently communicated the results of his investigations on the distribution of colors in the animal kingdom to the Academy of sciences at Turin. Colors, he says, in the frequency of their occurrence, range in the following order: brown, black, yellow, gray and white, red, green, blue, and violet, the last of which is the most rare. They are, however, variable for different groups of animal life. Among the vertebrates, black, brown, and gray are the most common; among the invertebrates, red and yellow; green occurs most frequently among the lower types — never, however, in mollusks; violet appears in all the groups; while white is distributed very irregularly, but most commonly among aquatic animals.

The colors of animals generally bear some relation to the medium or situation which they inhabit. Aquatic animals usually have the colors more uniform and less lively than do the terrestrial ones. Not seldom they exhibit a transparency, and, when of brilliant colors, they generally live among seaweed and other aquatic plants, very seldom on rocks or sandy bottom. Birds of quick and rapid flight are not generally bright-colored. Animals living in sandy or rocky places are less varied and less highly colored than those living in regions covered with vegetation. The author denies the assertion that there is a constant relation between animals and their food-habits. Carnivorous animals living among rich foliage and flowers are often brilliant and varied, while many fruit-eating species are modestly or obscurely colored. The more rich a group is in species, the more varied, in general, are its colors. Intensity of coloration is not in direct relation with the amount of light to which the animal is habitually exposed, but bears a more direct relation with the general development, being diminished by deficient nutrition or disease.

A dry climate renders colors more sombre, while a moist one makes them more lively or clearer. Altitude also exerts an influence upon colors: according to the author, in the higher regions the more brilliant forms are observed, but this view is hardly borne out by facts in the animal kingdom, though vegetation may perhaps conform to it. Species of the lower groups inhabiting islands are more often sombre in color than allied species from the continents. Different regions also modify in different ways the predominating colors. In the arctic regions, white, gray, black, and yellow predominate; in Ethiopia, yellow and brown; in India, the different shades of yellow; in the tropics, green and yellow; in Australia, sombre colors, and especially black. Throughout the animal kingdom, animals of large size are generally less varied, or more monotonous, in coloration, than smaller individuals of the same groups. In most animals the more brilliantly colored or spotted portions of the body are the most exposed ones: this is especially the case in insects.

A NEW ENGLISH DICTIONARY.

THE great English dictionary of the Philological society originated in suggestions made in 1857 by Dean (now Archbishop) Trench. Though a great mass of material was collected and many eminent men lent their aid to the undertaking, yet in consequence of the death of the first general editor, Mr. Herbert Coleridge, and other disturbing conditions, the work languished until the year 1878. At that time the directorship was assigned to Dr. Murray; and the delegates of the Clarendon press consented, under certain conditions, to bear the expense of printing and publishing the dictionary. Work was at once resumed with ardor. More than eight hundred volunteer readers undertook to collect additional quotations from specified books. In the United States the reading was in charge of Prof. F. A. March of Lafayette college, Easton, Penn., who has been indefatigable in his efforts to aid this great enterprise. In the course of three years a million additional quotations were furnished, making the total number about three million and a half, selected by about thirteen hundred readers from the works of more than five thousand authors of all periods. The general editor has been aided by a considerable number of sub-editors, and various specialists have furnished material in their respective departments. The apparatus, therefore, for the construction of this dictionary, is such as the world has never before seen. It is a combination of all the resources of the English-speaking world, conducted by the men who represent the broadest and most intelligent scientific knowledge.

The aim of the dictionary, the editor states, "is to furnish an adequate account of the meaning,

A new English dictionary on historical principles. Parts i. and ii. Ed. by JAMES A. H. MURRAY, LL.D. Oxford, *Clarendon pr.*, 1884, 1885. f°.

origin, and history of English words now in general use, or known to have been in use at any time during the last seven hundred years. It endeavors, 1°, to show with regard to each individual word, when, how, in what shape, and with what signification, it became English; what development of form or meaning it has since received; which of its uses have in course of time become obsolete, and which still survive; what new uses have since arisen, by what processes, and when: 2°, to illustrate these facts by a series of quotations ranging from the first known occurrence of the word to the latest, or down to the present day, the word being thus made to exhibit its own history and meaning: and, 3°, to treat the etymology of each word on the basis of historical fact, and in accordance with the methods and results of modern philological science." The dictionary divides words and phrases into main words, subordinate words, and combinations. Main words are all single words, radical or derivative, and those compound words and phrases which are important enough to be treated in separate articles. Subordinate words include variant and obsolete forms of main words, and such words of bad form or doubtful existence as it seems proper to record. Combinations are usually dealt with under the main words which form their first element. The treatment of a main word comprises, first the identification, that is, the proper spelling and pronunciation, the grammatical designation, and the status, together with earlier spellings and the inflections; next the morphology or history of the form, that is, the derivation or etymology, the subsequent form-history, and miscellaneous facts respecting the history of the word; then the signification or sematology, obsolete senses being distinguished from those now in use; finally the illustrative quotations, which are arranged chronologically so as to give about one for each century. The scope of the dictionary is thus the largest possible, and it may properly be termed an encyclopaedia of English forms. The total number of words treated in the dictionary under the letter *A* is 15,123; namely, 12,183 main words, 1,112 combinations and compounds, and 1,828 subordinate words and forms, with synonymes. Of the 12,183 main words, 8,184 are current, 3,449 (28¼ per cent) are marked as obsolete, and only 550 (4½ per cent) as foreign or imperfectly naturalized. As the letter *A* comprises in English dictionaries about a sixteenth of the whole alphabet, the editor estimates the total number of words to be dealt with in the dictionary as upwards of 240,000: the main articles being 195,000; the subordinate articles, 28,000; and the combinations or compounds requiring separate explanation, 18,000.

The way in which the work has so far been executed is entitled to all praise. On the etymological part, the best scholarship of the day has been called in, and all available material utilized. The arrangement of the significations has been made with great care; and how complicated and difficult a matter this is, may be seen from the articles *A*, *after*, *back*, *attend*, *arise*, and many others. The pronunciation also is very carefully indicated. Throughout the book, American peculiarities are noted. Part ii. goes down to the word *batten*.

It is impossible in a brief notice even to mention the words which have curious and entertaining histories. Nobody can fail to find the reading of this dictionary a most profitable occupation. Going over its articles is like entering a new country, or like the voyage of discovery which a great landed proprietor makes through his own domains. English words take us all over the world, and bring us into connection with almost all known languages; and the science of English etymology is a very wide and difficult one. It is surprising how many words there are whose origin is still unknown, such as *andiron* and *average*. The word *abthane* shows how men's imaginations can construct entirely baseless significations. One evil side of Dr. Johnson's influence is seen in the word *ache*. The queer paths taken by Arabic words show themselves in our *admiral*.

I do not find in the dictionary mention of the forms *anywheres* and *aprioric*. The definition of the word *apocrypha* is incomplete: it should include the apocryphal writings of the New Testament times. In the etymolegical notices of the words *Arab*, *Aramaean*, it should be stated that these are originally from the Arabic and Aramaic languages. Under *Araby* in the illustrative quotations we miss Milton's 'Araby the blest.' There is no reference to the possible Arabic origin of the flower name *anemone* as 'wounds of Naaman or Adonis.' The historical explanation of *barmecide* is not quite correct: the family was not one of 'princes ruling at Bagdad just before Haroun-Al-Raschid,' but a Persian family who occupied the position of vezirs under the caliphs, and it is surprising that the spelling *Raschid*, this unnecessary Germanism for *Rashid*, is retained.

C. H. Toy.

Myopia is said, on good evidence, to be increasing with great rapidity in Europe. During the past fifteen years the proportion of near-sighted students in the Polytechnic school of France has risen from thirty to fifty per cent, and eighty per cent of the students have to wear glasses.